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Abstract

Consumption behaviour and financial literacy are primary factors in determining the financial well-being of retirees. This paper uses an existing financial literacy index to examine how financial literacy directly, and via an interaction with consumption patterns, affects elderly Australians' financial well-being. We find that most elderly Australians hold an optimistic attitude towards their financial situation, and those who are relatively older, more educated, healthier and outright homeowners are more likely to report higher levels of financial well-being. Financial literacy significantly improves financial well-being. It also helps strengthen the positive effects of meeting more of non-essential consumption needs on financial well-being.

Key words: Financial well-being; Consumption patterns; Financial literacy; Retirement

JEL Classification: D14, D12, J12, J26

1. Introduction

Population ageing is a global trend that challenges the well-being of elderly people, with a longer retirement life requiring increased financial resources (van Rooij et al., 2012, Boisclair et al., 2017). However, in the US, average savings rates are at record lows (Brüggen et al., 2017), implying that elderly people may outlive their savings as they reach older age (Skinner, 2007).

Financial well-being is closely related to personal and social welfare. In 2015, innovative income products for retired households were encouraged by the Australian Federal Government, aiming to improve retirees' financial well-being. However, reliable retirement income products are less likely to be identified and selected by the elderly with low financial literacy levels (Chu et al., 2017). Without regular and stable income sources, retirees are more likely to worry about their living standards and less likely to be financially satisfied (Kausel et al., 2016, Butt et al., 2017, Liao et al., 2017).

Healthy consumption behaviour helps improve people's quality of life and satisfaction with life (Lin et al., 2017); however, consumption patterns may change after retirement. Banks et al. (1998) propose the "Retirement Consumption Puzzle", wherein retired household should smooth consumption across time periods but they actually reduce consumption substantially at retirement. People tend to report low financial well-being if their actual consumption cannot meet their consumption needs (Earl et al., 2015). Hence, informed consumption decisions are of high importance for the newly retired to smooth their consumption patterns.

Financial well-being is beneficial on multiple levels. At the individual level, financial well-being is positively related to quality of life and mental and physical health (Blanchflower and Oswald, 2004). It also strengthens interpersonal relationships and improves performance at work (Brüggen et al., 2017). At the organisational level, it facilitates formation of internal culture (stated goals, authority structure, and loyalty) and external reputation (brands, strategic alliances, reliability and accountability) (Vlachos et al., 2009). At the social level, it reduces societal and economic problems, improves formation

of social norms and cultures (Sacks et al., 2012), and enhances social welfare (Malone et al., 2010). Improvement in the financial well-being of the elderly is thus an effective way to improve their living standards and ultimately mitigate adverse consequences generated by population ageing.

Using big data techniques, Xue et al. (2019) have developed a financial literacy index (FLI), and analysed the relationship between financial literacy and socio-demographic characteristics amongst elderly Australians. We know from Xue et al. (2019) that financial literacy plays an important role in retired households' financial decision making; however, the elderly's financial well-being is still an emerging research area that requires empirical testing (Brüggen et al., 2017). Retirees make involuntary changes to their consumption patterns in terms of retirement, and so the picture of how financial literacy affects the elderly's retirement life is incomplete. Therefore, building and extending on Xue et al. (2019), we apply the FLI and examine how financial literacy, both by itself and via an interaction with consumption patterns, affects elderly Australians' financial well-being. This will shed more light on the elderly's financial well-being and provide ways to improve retired households' living standards and satisfaction with retirement life.

In prior literature, researchers tend to analyse consumption patterns based solely on actual consumption, ignoring consumption needs. However, it is important to consider consumption needs as part of consumption patterns because consumption is a needs-driven behaviour (Wilk, 2002, Higgins and Roberts, 2011). We take into account both actual consumption and consumption needs, analysing changes in consumption patterns of retirees and utilising Text Mining (TM) techniques to discover reasons for these changes in consumption. Further, we investigate the effects of changes in consumption patterns on financial well-being across two dimensions, namely basic consumption and non-essential consumption.

This paper also reveals the relationship between a broader range of socio-demographic characteristics and financial well-being than heretofore available, including empirical evidence that outright residence owners are more satisfied with their financial situation than mortgagors and renters.

2. Review of prior research

2.1. Financial well-being

Financial well-being is an emerging research area (Brüggen et al., 2017), although well-being has been broadly analysed from many different perspectives (Iyer and Muncy, 2016, Bobe and Cooper, 2018), such as sociology (Stevenson and Wolfers, 2008, Griggs et al., 2013) and psychology (Diener et al., 2003, Dittmar et al., 2014).

Some prior studies define and measure financial well-being objectively (Gaspart, 1997, Cifuentes et al., 2016), using different objective characteristics as indicators for financial well-being, such as income (Porter and Garman, 1992) and investment performance (Chu et al., 2017). Shim et al. (2009) focus specifically on students' financial well-being, using their level of debt as a measure of financial well-being.

In a recent conceptualization study, financial well-being was defined as “the perception of being able to sustain current and anticipated desired living standards and financial freedom” (Brüggen et al., 2017). The definition underlines the importance of subjective feelings. How people assess their financial well-being mainly depends on their own preferences irrespective of their objective financial situation, and, as such, people with similar socio-demographic characteristics may assess their financial well-being differently (Kapur, 2005).

Subjective assessment of individual financial well-being has also been advocated by other studies (Van Praag et al., 2003, Joo and Grable, 2004, Shim et al., 2009). Malone et al. (2010) report that people may assess their financial well-being differently based on their life stage. Perception of financial well-being also depends on highly individualised benchmarks for comparison (Garman et al., 2004). Overall, subjective indicators outweigh objective ones in evaluating individual financial well-being (Brüggen et al., 2017).

Managing financial well-being is extremely important as quality of life may be directly and indirectly impacted by how individuals perceive their financial well-being (Joo and Grable, 2004). Positive perception of financial well-being can lead to pleasure, passion, hopefulness, excellent health, and well-developed interpersonal relationships (Judge

et al., 2010, Taylor et al., 2011). These physical and mental factors can positively affect performance at work and financial behaviour (Brüggen et al., 2017), which ultimately reduce societal problems and improve social welfare (Griggs et al., 2013). On the other hand, negative perception of financial well-being may cause anxiety, violence, fatigue, and poor health (Bridges and Disney, 2010, Fitzpatrick and Ogden, 2011). Financially destructive behaviour is also likely to emerge, such as paying bills late and foreclosure. Crime, welfare dependency, and other societal problems may thus increase (Sacks et al., 2012).

2.2. Consumption and financial well-being

Relatively little research has explored the effects of consumption on personal well-being (Markowitz and Bowerman, 2012). There are two conflicting views in the few existing studies. Stutzer and Frey (2010) state that higher consumption level is associated with higher utility and thus higher subjective well-being. On the other hand, however, Markowitz and Bowerman (2012) find that reducing consumption improves individual and societal well-being in the long term. This discrepancy indicates a need for empirical testing on the relationship between consumption and financial well-being.

Consumption is a needs-driven behaviour and consumption needs are thus a key element of consumption patterns (Wilk, 2002) that should not be ignored in consumption research. However, prior research tends to focus solely on actual consumption; namely, what people have purchased. This approach fails to take into account the fact that people have differing consumption needs. Hence, it is important to view actual consumption in the context of consumption needs.

Consumption needs are unstable, increase with income and consumption level, and are generally above the current actual consumption level (Stutzer, 2004). When people have adapted to a consumption pattern, the effects of additional purchases on their well-being wear off as time passes (Stutzer, 2004). This provides further evidence for why consumption needs, in addition to actual consumption, should be considered when examining the relationship between consumption and financial well-being.

Moreover, consumption generally consists of basic and non-essential components. Retirees, on average, consume relatively more on basic goods and services - food, housing and medical care - to remain happy and healthy (Abdel-ghany and Sharpe, 1997). Additional pleasures are achieved through non-essential consumption, such as alcoholic beverages and travelling (Wilk, 2002).

We consider both actual consumption and consumption needs by forming a new construct: *whether people's actual consumption meets their consumption needs*. The effect of this construct on financial well-being is then examined, for basic, non-essential, and all consumption.

2.3. Financial literacy and financial well-being

Several of the few existing studies identify a positive relationship between financial literacy and financial well-being (Cheah et al., 2015, Shen et al., 2016, Grohmann, 2018); that is, retired households endowed with higher levels of financial literacy are more likely to be satisfied with their financial situation.

It appears that people with broad financial knowledge and advanced financial skills are more likely to access innovative products, services and technologies, identify appropriate retirement income products (Chu et al., 2017), and select profitable investment strategies (Kramer, 2016). They are hence more likely to receive higher financial returns and have higher financial well-being.

In addition, the mechanisms of how financial literacy affects financial well-being may not be consistent across all circumstances. Consider food consumption and alcohol consumption for example. Food consumption is a basic need that is essential for every person. Inability to meet this basic consumption need would cause stress and potential violence (Lockie et al., 2002), decreasing the level of financial well-being for both financially literate and illiterate people. Hence, financial literacy by itself may improve people's welfare, but it does not drive the effects of meeting food consumption needs on financial well-being.

In contrast, the results may alter with respect to alcohol consumption. Alcohol intake

is not essential to ordinary people, and to some extent, could be regarded as leisure consumption (Krause et al., 1997). People start leisure consumption when their basic consumption needs have been covered (Iyer and Muncy, 2016). In this circumstance, financial literacy directly and indirectly improves financial well-being: financial literacy by itself increases financial well-being through higher financial returns by appropriate financial decisions, in addition to modifying and improving consumption decisions that in turn increase financial well-being. In comparison to basic consumption, financially literate people may benefit more from informed consumption behaviour.

Therefore, the mechanisms of how financial literacy affects retired households' financial well-being in the case of basic consumption and non-essential consumption must be examined separately. It is likely that financial literacy will play a different role in different circumstances as per the examples above.

2.4. Socio-demographics and financial well-being

Socio-demographic behaviour affects people's financial and psychological well-being (Barnard, 2016). Individual perception of financial well-being varies across age, gender, education, marital status, employment type, and health (Pudney, 2011, Meier and Sprenger, 2013, Degutis and Urbonavicius, 2013, Becchetti et al., 2017, Barnard, 2016).

Blanchflower and Oswald (2004) find a U-shaped relation between age and financial well-being; that is, middle-aged people appear to be less happy compared to the youth and elderly. Malone et al. (2010) concur with this finding, reporting that middle-aged people are faced with more intensive work, higher living costs, and greater family responsibilities that lead to reduced financial well-being. However, other studies indicate that financial well-being decreases over time, with the elderly reporting the lowest well-being levels (Degutis and Urbonavicius, 2013, Becchetti et al., 2017).

There is also no agreement on the relationship between gender and financial well-being. Alesina et al. (2004) reveal that males tend to be happier than females in the US and European countries, whereas Malone et al. (2010) show that American females are more likely to effectively manage financial well-being. However, Louis and Zhao (2002)

find no statistically significant relationship between gender and financial well-being.

Additionally, satisfaction with financial status is positively associated with education (Louis and Zhao, 2002, Blanchflower and Oswald, 2004, Gerrans and Heaney, 2016), marriage (Alesina et al., 2004, Malone et al., 2010), type of work (Helliwell, 2003, Degutis and Urbonavicius, 2013), and health (Dolan et al., 2008). Therefore, it is evident that research on financial well-being should also include a range of socio-demographic factors.

2.5. Summary and contributions

Building and extending on the work of Xue et al. (2019), we apply the financial literacy index to examine how financial literacy, both by itself and via an interaction with consumption patterns, affects elderly Australians' financial well-being. This will shed more light on the elderly's financial well-being and provide practicable ways to improve retired households' financial decision making and living standards. Specifically, we contribute to the existing literature in three key ways.

Firstly, we empirically test the effects of changes in consumption patterns of retirees on their financial well-being. We report how retirees' actual consumption and consumption needs change after retirement, using Text Mining (TM) techniques to reveal exact reasons for these changes. Both actual consumption and consumption needs are considered by forming a new construct: *whether people's actual consumption meets their consumption needs*. The effect of this construct on financial well-being is then examined for basic consumption (food, housing & utility, household goods & services, and medical care & health expenses) and non-essential consumption (alcohol & tobacco, and gifts & donations), respectively. Notably, researchers fail to take into account consumption needs in empirical consumption literature.

Secondly, financial literacy, both by itself and via an interaction with consumption patterns, is assessed in terms of its effects on financial well-being. The role of consumption plays in the relationship between financial literacy and financial well-being has not yet been investigated in previous studies. We empirically test relevant mechanisms with regard to the two aforementioned consumption dimensions: basic consumption and non-

essential consumption.

Finally, in addition to the socio-demographic factors studied in prior literature, we also include home owner status and examine how financial well-being varies across different socio-demographic groups. By covering a wider range of socio-demographic characteristics, the empirical results are likely to provide additional insight into financial well-being.

3. Methodology

We use the same survey dataset as used by Xue et al. (2019), which aimed to investigate how people's consumption preferences and welfare change after they retire. The data were gathered via a survey of 15,000 Australians aged 55 or above, who were randomly selected members of National Seniors Australia. 3,484 completed surveys were received, constituting a response rate of 23.23%. The financial literacy variable developed by the Item Response Theory (IRT) model in Xue et al. (2019) is a continuous variable, with higher values representing higher financial literacy levels.¹ The *post hoc* Harman common factor results show that the common factor only explains 18.490% of total variance, implying no common method bias (Chang et al., 2010, Linnenluecke et al., 2015).

Consistent with prior literature that states that subjective measures outweigh objective measures in assessing personal financial well-being, our measurement of financial well-being is based on a self-assessed Likert-type question. The question asked was:

- How would you rate your current state of financial well-being?

(1) *Very poor* (2) *Somewhat poor* (3) *Neither good nor poor* (4) *Fairly good* (5) *Very good*.

Responses to this survey question are illustrated in Figure 1.² In general, the majority of the respondents rated themselves as at or above the average well-being level “*neither good nor poor*”. A total of 494 (14.43%) people evaluated their financial well-being as

¹ Three financial literacy questions were used to construct the financial literacy index, two about investment strategy and one addressing time value of money. The original survey questions and methodology for developing the financial literacy index are presented by Xue et al. (2019).

² Unrecognisable and missing responses have been excluded, with a percentage of 1.72%.

“*very good*”. Approximately half of all respondents (49.80%) provided a “*fairly good*” assessment.

[Insert Figure 1 about here]

Those who assessed their financial well-being as at the average level accounted for 26.31%, whereas the figures for “*somewhat poor*” and “*very poor*” are only 7.54% and 1.90%, respectively. Taken together, these results indicate an optimistic attitude towards financial well-being amongst elderly Australians.

3.1. Financial well-being across socio-demographics

Based on prior research, we hypothesize that financial well-being (hereafter, FWB) varies with respect to socio-demographic characteristics.³ Figure 2 illustrates mean FWB values based on socio-demographic variables and partitioned by gender (FWB values range from 1=*very poor* to 5=*very good*).

[Insert Figure 2 about here]

Older respondents tend to report higher FWB levels. The overall pattern of FWB is upward, but there is a clear fluctuation within the female group. After a large drop in their seventies, FWB levels of females increase dramatically in their eighties. Males have higher levels of financial well-being than females before reaching 80 years old.

Consistent with the literature, higher educational attainment is associated with higher FWB ($t=7.36$, $p < 0.001^4$). Notably, male respondents with a university or higher education background, on average, rated themselves with the highest FWB level amongst all socio-demographic groups. In addition, males tend to report slightly higher FWB levels than females with regard to each education category ($t=3.03$, $p < 0.01$ for “*Higher Education*”; $t=3.25$, $p < 0.001$ for “*Other*”). The same finding for gender holds true in the case of marital status, employment type, self-assessed health, and home ownership.

³ Similar to Xue et al. (2019), a regression tree and Lasso regression are utilised to select the socio-demographic variables for the final model. Seven socio-demographic variables are retained, including *Age*, *Gender*, *Education*, *Marital Status*, *Employment Type*, *Health*, and *Home Ownership*, and the other five are eliminated, including *Wealth*, *Income*, *Retirement Status*, *Loan*, and *Earning*.

⁴ A standard two-sample t-test for the mean without assuming constant variance is used.

As expected, and consistent with prior literature, married households are more satisfied with their finances than single households ($t=5.75$, $p < 0.001$). Compared to blue collar workers, those who are pink or white collar are also more satisfied with their financial situation ($t=4.94$, $p < 0.001$).

A difference is also identified in FWB according to self-assessed health. Respondents in good or above health conditions are prone to hold a much more optimistic attitude towards their financial situation than those in poor or fair health ($t=11.78$, $p < 0.001$).

A unique finding concerns the relationship between home owner status and financial well-being. The mean FWB of outright home owners is higher relative to the figure for renters and mortgagors ($t=12.04$, $p < 0.001$). This is a novel finding that has not been empirically tested in prior research.

The findings in this section give preliminary insights into self-rated FWB and socio-demographic characteristics. The results of the regression modelling will generate more in-depth insights.

3.2. Changes in consumption patterns

In the survey, consumption was divided into six sub-categories: food & non-alcoholic beverages; housing & utilities; household goods & services; medical care & health expenses; alcohol & tobacco, and gifts & donations (consistent with Higgins and Roberts, 2011). An explanation of these sub-categories is listed in Table 1. We cluster the first four consumption sub-categories as basic consumption and the last two as non-essential consumption. The basic consumption categories are important for retired households, and to some extent, are required in their daily life. However, spending on alcohol & tobacco and gifts & donations is discretionary and so they are categorised as non-essential consumption.

[Insert Table 1 about here]

Two survey questions about actual consumption and consumption needs were asked for each consumption sub-category:

- **Actual consumption:** Does your household purchase approximately the same quantity, more or less now than it did before you retired from paid work?

(A) *More* (B) *Same* (C) *Less* (D) *Not sure*

- **Consumption needs:** Has your households consumption need increased, decreased, or stayed the same since before you retired from paid work?

(A) *More* (B) *Same* (C) *Less* (D) *Not sure*

3.2.1. Changes in actual consumption

Table 2 summarises responses to consumption questions. To reflect changes in consumption patterns after retirement, only retired respondents were asked. Overall, as shown in column 3 (Actual), retirees consumed the same amount as they did before they retired. They are able to maintain their consumption standards in retirement. The decrease in consumption associated with the “Retirement Consumption Puzzle” is thus not observed in Australia.

[Insert Table 2 about here]

As shown in Table 2, most respondents (63.6%) spent approximately the same on food & non-alcoholic beverages as before they retired, while 28.0% reported a decrease in this category. Only about 8% of all respondents stated that they consumed more food & non-alcoholic drinks after retirement.

Changes in expenditure on housing & utilities and household goods & services demonstrate a similar pattern. Around 60% of all respondents maintained the same consumption level, slightly less than 20% decreased, and more than 20% increased their consumption in these categories.

As expected, and consistent with prior research, medical expenses increase rapidly as people age (De Nardi et al., 2010). It is apparent from the table, more than half (50.5%) of retired individuals increased their medical care & health expenses, whereas only 6.1% reported a decline. Those whose medical costs remained unchanged accounted for 43.4%.

Consumption of non-essential categories shows a different pattern compared with basic consumption. Although 52.2% of all respondents kept the same consumption level of alcohol & tobacco as they did before they retired, a large proportion (43.4%) in the sample cut back on this category. Only a minority of people increased their alcoholic and smoking consumption.

A similar pattern can be found in spending on gifts & donations. The percentage of people who provided a “*same*” response is 50.7%. More than one-third of respondents stated that they reduced their spending on gifts & donations, while less than 15% said they increased such spending.

Another question was included in the survey to identify the reasons for consumption changes. The question asked was:

- If you stated that your household purchases less now or more now of the following goods and services than before you retired from paid work, please briefly state why this is the case.
 - 1) Food & non-alcoholic beverages
 - 2) Housing & utilities
 - 3) Medical care and health expenses

Respondents provided text responses to these three categories. Text Mining (TM) techniques are utilised to explore exact reasons for consumption changes of retirees.⁵ The reasons with respect to each category are summarised in Table 3.

[Insert Table 3 about here]

The primary reasons for changes in food & non-alcoholic beverages are increasing costs and insufficient funds, both with a percentage of above 20%. The positive association between insufficient funds and consumption decline is consistent with prior studies (Lusardi, 1999, Skinner, 2007). These reasons are followed by eating less, eating out less and living alone. More than 6% of respondents who provided text responses attributed

⁵ The package “tm” in R-3.5.1 is applied. It eliminates punctuation, numbers, white space and English common stopwords (e.g., “be”, and, “a” etc.) and stems words with the same root.

their food consumption changes to getting older and self-producing (home production). Such a decline in food consumption as a result of home production and cessation of work-related expenses has also been reported in the existing literature (Aguiar and Hurst, 2005, Hurd and Rohwedder, 2008).

The main reason for changes in housing & utilities is increasing costs. Other reasons include using less utilities, increasing needs of repair and maintenance, insufficient funds, and staying at home more. Movement to a retirement village could also lead to a decline in housing & utility consumption.

Changes in medical care and health expenses result from ageing and the associated increase in medical and medication costs, with percentages of 44.82% and 37.10%, respectively. Increasing insurance costs also contribute to this increase. Discount/insurance cover helps reduce medical and health expenditure.

3.2.2. Changes in consumption needs

Although a sizeable proportion of respondents maintain a similar level of consumption needs as they did before they retired, the proportion who reported an increased need for basic consumption is larger than those who actually purchased more; namely, 14.7% reported increased food & non-alcoholic beverages needs, while only 8.3% reported an actual increase. Interestingly, this difference is relatively small for non-essential categories. Overall, the number of retirees with actual consumption decline is greater than the figure for consumption needs decline.

A considerable number of people (65.3%) did not change their needs for food & non-alcoholic beverages after they retired. Nearly 20% of respondents reported a reduced need in this category. The remaining 14.7% of people needed more food & non-alcoholic drinks after retirement. The pattern of housing & utilities expenses and household goods & services is similar.

Not surprisingly, the need for medical costs increased dramatically after retirement. Fewer than 5% of retirees reported a decline in medical demand.

In contrast, a different pattern is found for changes in non-essential consumption

needs. Approximately one-third of respondents required a lower level of non-essential consumption after retirement. The proportions of people who needed increased expenditure on alcohol & tobacco and gifts & donations are only 5.5% and 14.9%, respectively.

3.3. Model specification

We incorporate actual consumption and consumption needs by forming a new construct: *whether actual consumption meets consumption needs* (hereafter, *ConsMet*), as shown in Table 4.

[Insert Table 4 about here]

ConsMet is a binary variable, consisting of two levels - *Met* (coded as 1) and *Unmet* (coded as 0). *ConsMet* is calculated for all six consumption sub-categories. Next, the number of “*Met*”s is aggregated separately for basic consumption and non-essential consumption, creating two aggregated variables: *ConsMet-B* (for basic consumption) and *ConsMet-N* (for non-essential consumption). The corresponding contingency table is shown in Table 5.

[Insert Table 5 about here]

An ordinal logistic regression (OLR) model is used to analyse ordered categorical data with a consideration for the ranking order (Larasati et al., 2011). As financial well-being (FWB) is a Likert scale variable with 5 ordered responses, the OLR model is appropriate to examine the effects of financial literacy (hereafter, FL) and *ConsMet* on financial well-being (FWB). The model specifications are as follows:

For **basic consumption** (*ConsMet-B*):

Model (1) (base model):

$$\text{logit}(P(FWB_i \leq j)) = \theta_j - (\beta_1 FL + \beta_2 \text{ConsMet-B} + \beta_3 x_1 + \dots + \beta_9 x_7)$$

Model (2) (with interaction term added):

$$\text{logit}(P(FWB_i \leq j)) = \theta_j - (\beta_1 FL + \beta_2 \text{ConsMet-B} + \beta_3 \text{ConsMet-B} * FL + \beta_4 x_1 + \dots + \beta_{10} x_7)$$

For **non-essential consumption** (*ConsMet-N*):

Model (3) (base model):

$$\text{logit}(P(FWB_i \leq j)) = \theta_j - (\beta_1 FL + \beta_2 ConsMet-N + \beta_3 x_1 + \dots + \beta_9 x_7)$$

Model (4) (with interaction term added):

$$\text{logit}(P(FWB_i \leq j)) = \theta_j - (\beta_1 FL + \beta_2 ConsMet-N + \beta_3 ConsMet-N * FL + \beta_4 x_1 + \dots + \beta_{10} x_7)$$

where i represents the individual and j is the ordered level of *FWB* category⁶; $P(FWB_i \leq j)$ follows a logistic distribution⁷ and the standard interpretation of coefficients still applies: for $\beta > 0$, an increase in the explanatory variable results in an increased probability of being in a higher financial well-being category. Variables x_1, x_2, \dots, x_7 refer to employment type (*Employ*), home ownership (*Tenure*), age (*Age*), gender (*Gender*), marital status (*Marital*), education attainment (*Edu*), and self-assessed health (*Health*), respectively.

4. Results

Thus far, we have provided descriptive statistics for *FWB*, and changes in actual consumption and consumption needs (and reasons for those changes). This section analyses the ordinal logistic regression (OLR) results for basic consumption (Section 4.1) and non-essential consumption (Section 4.2).

⁶ $P(FWB_i \leq 5) = 1$, so it is only necessary to model the remaining four (5-1) *FWB* categories. More detail about the ordinal logistic regression (OLR) model can be found in Agresti (2003).

⁷ Taking Model (1) for example:

$$P(FWB_i \leq j) = \frac{\exp(\theta_j - (\beta_1 FL + \beta_2 ConsMet-B + \beta_3 x_1 + \dots + \beta_9 x_7))}{1 + \exp(\theta_i - (\beta_1 FL + \beta_2 ConsMet-B + \beta_3 x_1 + \dots + \beta_9 x_7))}$$

where θ_j varies with j ($j=1,2,3,4$) and β s are invariant across the four categories.

4.1. FL, basic consumption needs and FWB

Table 6 shows the results for the ordinal logistic regression (OLR) model in terms of basic consumption (*ConsMet-B*). Consistent with the existing literature (Hung et al., 2009, Schmeiser and Seligman, 2013, Brüggem et al., 2017), financial literacy significantly improves financial well-being. However, the interaction between *ConsMet-B* and FL in model (2) is not statistically significant at conventional levels, implying that financial literacy by itself has a direct effect on financial well-being but has no bearing on the relationship between meeting basic consumption needs and financial well-being.

[Insert Table 6 about here]

Respondents appear to be more financially satisfied when basic consumption needs are met. This positive effect is consistent across model (1) and model (2), indicating a direct effect for *ConsMet-B*. Interpretations and comparisons with non-essential consumption (*ConsMet-N*) are discussed in Section 4.3.

Consistent with prior research (Degutis and Urbonavicius, 2013), the effect for employment type is not statistically significant. Because all respondents analysed in the sample were retired, this result is likely to be explained by the effects of different work types on FWB gradually wearing off over time.

We make a contribution to the literature by being the first to provide empirical evidence concerning the relationship between home ownership and financial well-being. The results demonstrate that outright home owners appear to be more satisfied with their financial situation than mortgagors and renters. This may result from the fact that outright owners are less likely to worry about mortgage repayments or rent.

Although the relationship between age and financial well-being is statistically significant, the effect is limited with a coefficient only slightly greater than 0. This indicates that amongst elderly Australians, relatively older people are slightly more likely to be satisfied with their financial status. This concurs with our descriptive statistics that financial well-being generally increases with age, as older adults are more likely to benefit from greater financial experiences (Asher et al., 2017).

The lack of statistically significant results for gender is consistent with the literature (Louis and Zhao, 2002) and reflects the complexity of gender differences in financial well-being. On the one hand, males tend to be more financially knowledgeable than females (Lusardi and Mitchell, 2007, 2011) and females are thus more financially insecure (Bucher-Koenen and Lusardi, 2011). However, on the other hand, most household purchasing decisions in married households are controlled by women (Qualls, 1987) and they are therefore more experienced in handling financial losses (Parks-Yancy et al., 2007). The mixed findings regarding gender may also result from differences in risk aversion and the fact that women in the sample typically live longer than men.

Marital status is significantly and positively associated with financial well-being. Marriage provides people with financial security (Dew, 2009) since “two heads are better than one in money management” (Blinder and Morgan, 2005, pp.801). Married households integrate the family’s financial information and are hence more likely to take low-cost debts and make informed financial decisions (Lusardi and Tufano, 2015). As a result, their financial situation is often better than that of unmarried people.

Consistent with the majority of extant studies, more educated people tend to report higher financial well-being levels, as education can improve an individual’s abilities of financial management (Gerrans and Heaney, 2016), precautionary financial planning (Eugster, 2017), and other related skills.

Not surprisingly, healthier people are more satisfied with their financial status. Elderly people who are in good health condition are able to spend more time collecting financial information, attending financial education programs, engaging in financial practices, and learning financial technology, which hence leads to increased satisfaction with their financial situation and improved living standards.

4.2. FL, non-essential consumption needs and FWB

Table 7 presents the OLR estimates for non-essential consumption (*ConsMet-N*). *ConsMet-N* significantly improves FWB, suggesting that people who are capable of meeting more of their non-essential consumption needs are more satisfied with their financial situation.

[Insert Table 7 about here]

The direct and positive effect of financial literacy on financial well-being is apparent from Table 7. Notably, the interaction effect ($ConsMet-N*FL$) is positive and significant. Taken together, the results indicate that financial literacy helps strengthen the effects of meeting non-essential consumption needs on financial well-being. This effect is in addition to the direct effect of financial literacy on improving financial well-being, suggesting that financially literate people are more likely to smooth and modify their consumption behaviour and reap greater benefits from meeting more of their non-essential consumption needs.

Aside from marital status, the results for socio-demographic variables are consistent with the findings for basic consumption. As shown in Table 7, marriage does not lead to a significant increase in FWB. It is notable that the coefficient of $ConsMet-N$ is considerably larger than the figure for $ConsMet-B$. Accordingly, the effect for marital status is absorbed by the effect for $ConsMet-N$. In a practical sense, married households are more likely to be satisfied with their financial situation compared to unmarried people when only basic consumption needs are considered (or when household consumption level is low). The power of marriage in determining household financial well-being is transitory. It gradually diminishes as people increasingly meet additional material consumption needs. This explains the lack of statistical significance for marital status when more non-essential consumption needs are met.

4.3. Discussion

4.3.1. Robustness test

An ordinal logistic regression (OLR) model was estimated for the initial six consumption sub-categories individually. The results are consistent with main findings regarding the relationship between financial literacy, basic and non-essential consumption needs, and financial well-being. We also re-estimated the model after adding other socio-demographic variables used by Xue et al. (2019), including wealth, income, and partner's employment type. The main results again remained robust when these additional socio-demographic

variables were added to the final model. Detailed results for these robustness tests are available upon request.

4.3.2. Basic and non-essential consumption needs on financial well-being

We find that meeting basic consumption needs and meeting non-essential consumption needs both improve elderly Australians' financial well-being. Prior literature is conflicted about the relationship between consumption and well-being (Stutzer and Frey, 2010, Markowitz and Bowerman, 2012). Thus, the findings in this paper contribute to the literature by taking into account consumption needs and empirically showing the positive nexus between meeting consumption needs and financial well-being. The results further show that the positive effect is strongest for non-essential consumption.

4.3.3. The role of financial literacy

The empirical results clearly show that financial literacy by itself improves the elderly's financial well-being, as well as via an interaction with consumption patterns. In either case of basic or non-essential consumption, financial literacy by itself is a statistically significant and positive driving force of financial well-being. Furthermore, in the non-essential consumption case, the interaction effect is statistically significant and positive, implying that financial literacy helps strengthen the positive nexus between meeting non-essential consumption needs and financial well-being. Therefore, high financial literacy can help smooth and modify retired individuals' consumption patterns, and hence help them reap increased benefits from meeting more of their non-essential consumption needs. Taken together, the results provide empirical evidence that improving retired households' financial literacy is key to enhancing their financial well-being.

5. Conclusions and future research

Building and extending on the work of Xue et al. (2019), we apply the financial literacy index to examine how financial literacy, by itself and via an interaction with consumption patterns, affects retired households' financial well-being. In doing so, more light is shed

on the importance of financial literacy regarding the elderly's financial well-being.

We find that overall, elderly Australians hold an optimistic attitude towards their financial well-being. People who are relatively older, more educated, healthier, and outright home owners are more likely to be satisfied with their financial situation. Our finding that outright home owners are more satisfied with their financial status than mortgagors and renters represents the first, to our knowledge, empirical evidence on the relationship between home ownership and financial well-being. We also find the effect of marriage on financial well-being gradually diminishes as consumption levels increase. Aside from these socio-demographic factors, employment type and gender have no bearing on the elderly's financial well-being.

Consumption patterns and financial literacy are key determinants of retired households' financial well-being. Changes in actual consumption and consumption needs of retirees are explored, demonstrating that elderly Australians are able to maintain their consumption standards after retirement and the "Retirement Consumption Puzzle" is not observed in Australia. Notably, although consumption is a needs-driven behaviour (Wilk, 2002), consumption needs are rarely considered in empirical consumption research.

In the survey used, consumption comprised six categories. Text Mining (TM) techniques were utilised to reveal reasons for changes in actual consumption. It shows that increasing costs and insufficient funds result in changes in food and non-alcoholic beverages consumption. Increasing costs also limit consumption capacity regarding housing and utilities. Changes in medical care and health expenses are mainly attributed to ageing problems and increasing medical/medication costs.

The six categories are grouped into basic consumption and non-essential consumption. We consider both actual consumption and consumption needs by forming a new construct: *whether people's actual consumption meets their consumption needs*. The effect of this construct on financial well-being is then examined for basic consumption and non-essential consumption, respectively. The distinct roles of financial literacy in these relationships are also assessed.

Results using ordinal logistic regressions (OLR) clearly show that meeting both basic

and non-essential consumption needs significantly improves financial well-being. This positive effect is strongest for non-essential consumption. Financial literacy by itself significantly improves financial well-being. Financial literacy also helps strengthen the positive effects of meeting non-essential consumption needs on financial well-being. The results indicate that higher levels of financial literacy could help smooth and modify retirees' consumption decisions, and hence help them improve their financial well-being from meeting more of their non-essential consumption needs. Taken together, the findings provide evidence that improving retired households' financial literacy is key to enhancing their financial well-being.

This study highlights the importance of financial literacy, both by itself and via an interaction with consumption patterns, in improving retired households' financial well-being. Xue et al. (2019) reported that a large proportion of elderly Australians are engaging with technology. Therefore, we suggest future research examine the effectiveness of Financial Technology (FinTech) services and products as a practicable way to facilitate elderly Australians' financial decision making and improve their financial literacy, and ultimately enhance their financial well-being.

Consider robo-advisors for instance. They automatically recommend investment strategies and wealth management strategies based on the consumer's characteristics and risk preferences. Perhaps for financially illiterate people, they may have a clear list of candidate financial strategies rather than being uncertain or blind about numerous and fast-changing financial services and products; however, we cannot be sure and future research is needed to confirm. For literate individuals, they are likely to have more information to help them make and modify their financial decisions. Importantly, elderly consumers may take advantage of the financial advice recommended by robo-advisors because they do not have to visit a professional in person. It is hence important to explore the effect of FinTech products such as robo-advisors on elderly people's financial well-being in future research.

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Table 1: Explanation of consumption categories

Category	Explanation
Basic Consumption:	
Food & non-alcoholic beverages	This includes food and non-alcoholic beverages for meals at home and meals out, including restaurants, clubs, fast food and takeaway.
Housing & utilities expenses	This includes housing costs: e.g. rent and mortgage repayments, house and contents insurance, rates, land tax, repairs and maintenance (R&M), and body corporate payments. It also includes utilities, such as electricity and gas. It excludes expenditure on household goods and services besides R&M.
Household goods & services	This includes household goods: e.g. kitchen and laundry appliances, air-conditioners, furniture, floor covering, paintings, linen, glassware, tableware, utensils, phones, tools, telephones. It also includes household non-durables such as garden plants, other gardening products, and cleaning products, telephone and mobile charges, household services such as pest control, gardening, housekeeping and cleaning, home help, security, and R&M of household durables.
Medical care & health expenses	This includes accident and health insurance, fees, pharmaceuticals, therapeutic equipment, hospital and nursing home charges.
Non-essential Consumption:	
Alcohol & tobacco	All alcoholic beverages and tobacco and tobacco products, such as cigarettes, pipes, etc.
Gifts & donations	Donations/Cash or other gifts to charity, family or friends.

Note: The explanation is similar to that shown in Higgins and Roberts (2011).

Table 2: Responses to actual consumption and consumption needs

Category		Actual(%)	Needs(%)
Basic Consumption:			
Food & non-alcoholic beverages	Decrease	28.0	19.9
	Same	63.6	65.3
	Increase	8.3	14.7
Housing & utilities expenses	Decrease	17.0	13.5
	Same	57.1	50.9
	Increase	25.9	35.6
Household goods & services	Decrease	18.7	13.6
	Same	60.1	54.6
	Increase	21.3	31.8
Medical care & health expenses	Decrease	6.1	4.4
	Same	43.4	40.8
	Increase	50.5	54.7
Non-essential Consumption:			
Alcohol & tobacco	Decrease	43.4	36.8
	Same	52.2	57.6
	Increase	4.4	5.5
Gifts & donations	Decrease	34.5	31.5
	Same	50.7	53.7
	Increase	14.9	14.9

Table 3: Reasons for consumption change: determined by Text Mining

Food and non-alcoholic beverages		Housing and utilities		Medical care and health expenses	
Reason	Percentage (%)	Reason	Percentage (%)	Reason	Percentage (%)
increasing costs	20.80	increasing costs	46.31	health problems as ageing	44.82
insufficient funds	20.38	using less	12.85	increasing medical/medication costs	37.10
eating less	12.15	repair&maintenance needs	12.29	increasing insurance costs	12.78
eating out less	10.14	insufficient funds	9.36	discount/insurance cover	9.43
living alone	9.29	staying at home more	6.90	good health	1.95
getting older	6.86	moving to retirement village	3.97	only one person to cover	1.40
self-producing	6.44	living alone	2.74		
dependent leaving	4.75	new home/appliances	1.51		
no work-related	2.65				
socialising more	2.43				

Note: The summation of each column is not equal to 100 (%) because some people provided multiple responses.

Table 4: Classification of “Met” and “Unmet” for *ConsMet* variable

		Actual consumption		
		Increase	Same	Decrease
Consumption needs	Increase	Met	Unmet	Unmet
	Same	Met	Met	Unmet
	Decrease	Met	Met	Met

ConsMet: whether actual consumption meets consumption needs.

Table 5: Contingency table of variable *ConsMet-B* and *ConsMet-N*

Variable	0	1	2	3	4
<i>ConsMet-B</i>	57 (2.89%)	122 (6.18%)	175 (8.86%)	371 (18.78%)	1250 (63.29%)
<i>ConsMet-N</i>	31 (1.74%)	225 (12.63%)	1526 (85.63%)		

ConsMet-B: How many basic consumption categories were met;

ConsMet-N: How many non-essential consumption categories were met.

Table 6: OLR results for basic consumption

Variable	Model (1)	Model (2)
FL	0.47***	0.82***
ConsMet-B	0.28***	0.28***
ConsMet-B*FL		-0.11
Employ (1=pink/white collar)	0.19	0.20
Tenure (1=outright)	1.11***	1.11***
Age	0.02***	0.02***
Gender (1=male)	-0.12	-0.12
Marital (1=married)	0.27**	0.27**
Edu (1= \geq uni.)	0.34***	0.35***
Health (1=healthy)	0.89***	0.89***

Dependent variable: financial well-being (FWB).

***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$

Table 7: OLR results for non-essential consumption

Variable	Model (3)	Model (4)
FL	0.52***	0.77***
ConsMet-N	0.60***	0.61***
ConsMet-N*FL		0.38*
Employ (1=pink/white collar)	0.18	0.17
Tenure (1=outright)	1.10***	1.11***
Age	0.02**	0.02**
Gender (1=male)	-0.14	-0.14
Marital (1=married)	0.11	0.10
Edu (1= \geq uni.)	0.32***	0.31***
Health (1=healthy)	0.88***	0.87***

Dependent variable: financial well-being (FWB).

***: $p < 0.001$; **: $p < 0.01$; *: $p < 0.05$

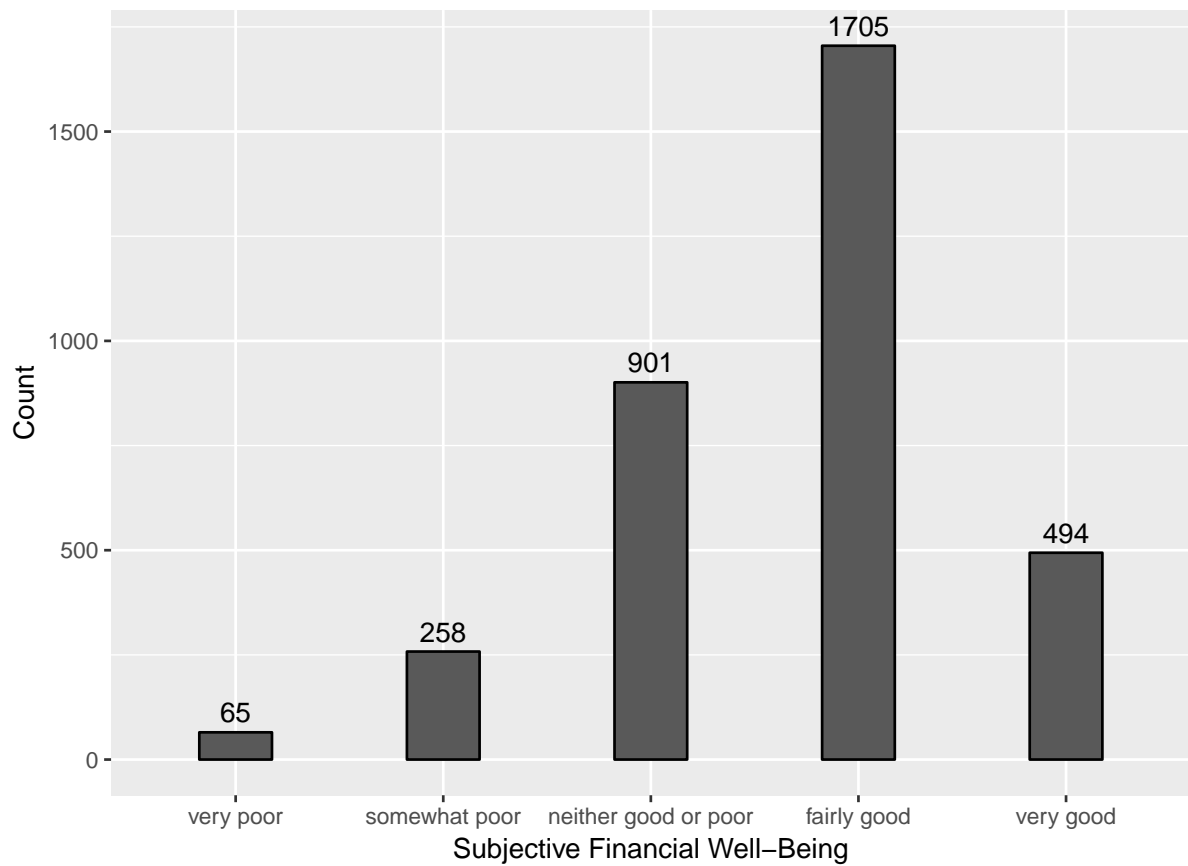


Figure 1: Responses to self-assessed financial well-being question

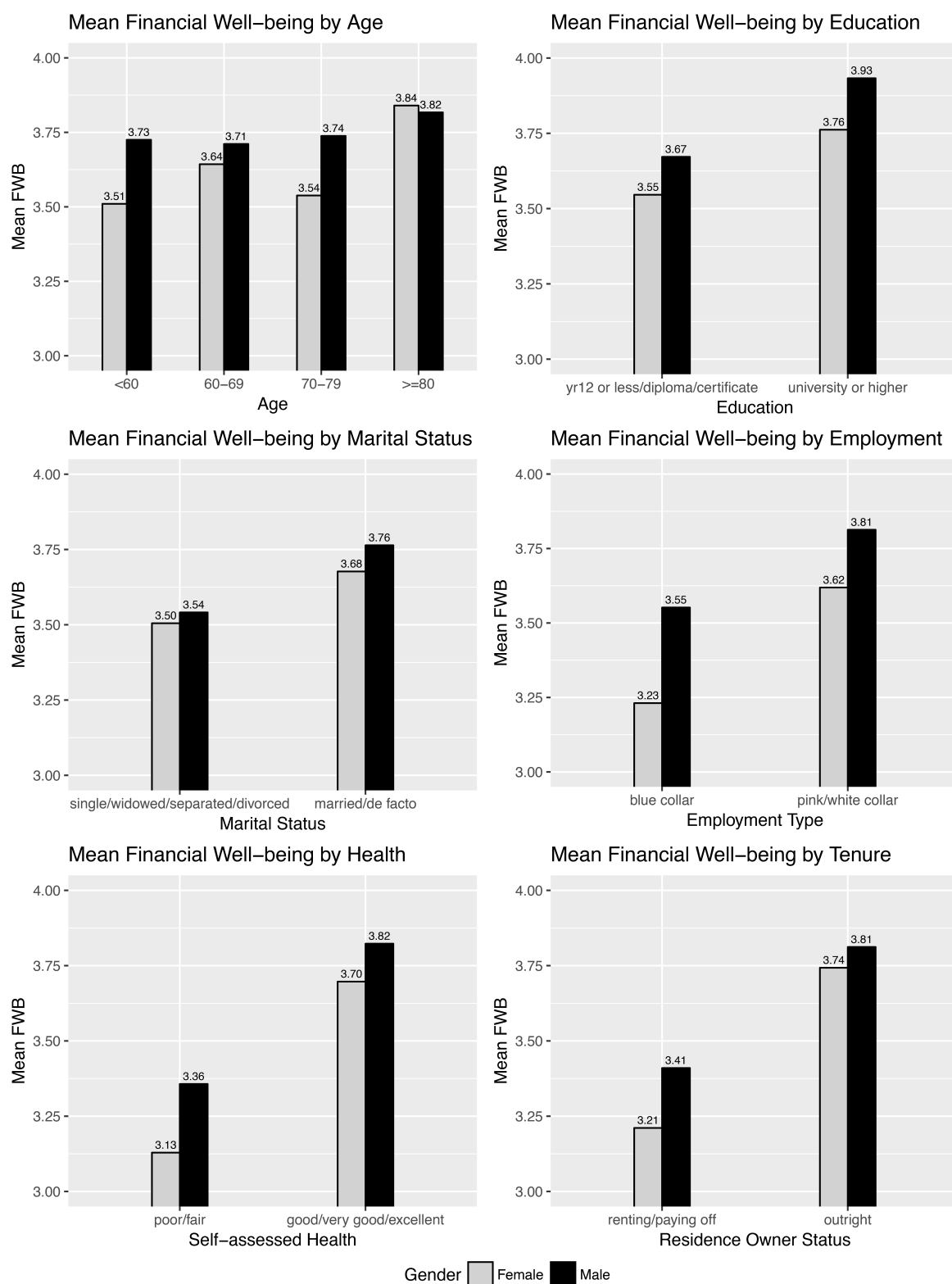


Figure 2: Mean financial well-being by gender and by other demographics